



4.3.14 Structural Fires

This section provides a profile and vulnerability assessment of the structural fire hazard for the Chester County Hazard Mitigation Plan (HMP) update.

4.3.14.1 Location and Extent

Structural fires within Chester County have had a detrimental impact on life, property, and the local economy over the past decade. The age of many residential structures within the region, combined with changes in building construction and materials, created a threat of fire loss that is occurring on a regular basis.

As defined by the National Fire Protection Agency (NFPA) in the *NFPA 901: Standard Classifications for Incident Reporting and Fire Protection Data*, a structure fire is defined as “Any fire inside, on, under, or touching a structure.” This definition includes any mobile living structure, such as a mobile or modular residence, but does not include road-worthy vehicles such as recreation vehicles (NFPAa 2011).

4.3.14.2 Range of Magnitude

The severity of structural fires varies according to the losses associated with the incident. The impact to the local economy is minimal with the loss of a residential structure; however, effects of the loss of a large manufacturing facility that employs a large number of people can be extensive. Likewise, the impact to the local environment from a single residential fire is minimal, while the impact from an industrial or commercial fire can take years to measure. Finally, the loss of life caused by structural fires appears to be opposite of the previous two impacts. The loss of life during a residential fire is more likely than during an industrial or commercial building fire. The building composition is combined with the hour of the incident to increase the loss of life during a residential-type fire.

The structural fires within Chester County are usually small and generally affect residential structures. These fires are limited in duration and are generally contained within the local jurisdiction. While the average fire is small, the threat from a large or even catastrophic fire is always present. Many operations within larger industrial and commercial sites within Chester County are prone to and have experienced small fires that, if improperly contained, can and do lead to catastrophic fire losses. Combined with the presence of volatile materials, these threats are ever changing and increasing within the region.

Vacant buildings (both residential and commercial) pose a particular threat concerning structural fires. Multiple incidents of structural fires in unoccupied homes have been reported through the Knowledge Center.

4.3.14.3 Past Occurrence

Structural fires most frequently affect residential communities within Chester County.

Structural fire data are available from 2017 to June 2020; during this period, a total of 3,377 structural fires were reported in Chester County. A total of 976 structural fires were reported in the county in 2017; 1,013 fires were reported in 2018; and 986 fires were reported in the county in 2019. From January to June 2020, a total of 402 fires have been reported (Chester County 2020). Details on losses, injuries, and fatalities caused by these events were not found. No federal disasters have been declared as a result of structural fires in Chester County.

4.3.14.4 Future Occurrence

Based on the Risk Factor Methodology Probability Criteria, structural fires are categorized as *highly likely*. An NFPA 2009 report based on historical data collected entitled, *A Few Facts at the Household Level*, stated that



an average household is expected to experience a fire within a structure every 15 years based on an average expectancy of the household to be 78 years (NFPA 2009). While most of these fires will be considered small and may not cause any significant damage, the possibility of a catastrophic loss caused by fire is present. Given the rate of occurrence of fires each year in Chester County, the annual probability of a structural fire occurring in the county is 100 percent.

The NFPA reports that the rate of occurrence of home fire deaths has been cut roughly in half since 1980, and population-based home fire and fire death rates have fallen by roughly two-thirds. The death rate per 1,000 reported fires has remained fairly consistent and was actually slightly higher in recent years than in 1980. It appears that most of the reduction in fire deaths over the past decades is due to a reduction in total fires, rather than the prevention of harm after a fire is reported (NFPA 2018). This was driven by an even more pronounced increase in the rate for one- and two-family homes. Chester County has seen an increase in structural fires from 2017 to 2018, and a decrease from 2018 to 2019. The quantity of residential and industrial structures within Chester County, combined with a varying range of fire code enforcement, equates to a greater probability of loss in the future. In addition, the influx of commercial and industrial sites being developed within Chester County also increases the possibility of future commercial or industrial fires.

4.3.14.5 Vulnerability Assessment

Structural fires most frequently affect the residential communities within Chester County. While the impact of most structural fires is considered minimal because of the availability of support services after a fire, these fires need to be classified as a *high threat* based on the frequency and potential for injury and loss of life.

The increases in population within Chester County lead to a greater probability of structural fires. The sustained growth within the county, both commercial and residential, will continue to affect the threat of structural fires in the future.

To understand risk, a community must evaluate the assets that are exposed or vulnerable in the area identified. The following sections discuss the potential impact of the terrorism hazard on Chester County, including:

- Overview of vulnerability
- Impact on (1) life, health, and safety; (2) general building stock and critical facilities; (3) the economy; and (4) the environment
- Future growth and development
- Effect of climate change on vulnerability

Overview of Vulnerability

Many factors influence vulnerability to a structural fire. Age of structure, building materials, density of the area of the building location, proximity to flammable vegetation, and the presence of accelerants are all factors that influence likelihood and vulnerability to structural fire. Older structures may not have been built with the same level of fire prevention required by modern building codes and therefore may be more susceptible to fire than a modern structure. More densely-populated areas of Chester County face a higher vulnerability because of the proximity of residences to each other and other commercial structures. Industrial and commercial facilities are also susceptible to structural fire, and fires in these facilities may have a greater impact on the county.

Impact on Life, Health, and Safety

The impact of structural fires on life, health, and safety will vary depending on the size and magnitude of fires and availability of firefighting resources. Structural fires that occur in industrial or commercial buildings may have a significant impact on life, health, and safety depending on the contents of the structures. First responders'



safety may be at risk during on-scene operations. They may also have a limited access to roads due to obstructions or damaged infrastructure. First responders may have a higher than normal call volume and demand and additional responsibilities including traffic control and debris removal from roads.

Impact on General Building Stock and Critical Facilities

Structural fires will impact the Chester County general building stock. Impacts will vary based on the size and severity of the fire, and number of structures affected by the fire. Physical damage to structures and contents could occur. Impacts to critical facilities may include damage to equipment, interruption of emergency communications, or disruption of services. If a public safety or medical facility is affected, life, health, and safety of people within the county could be impacted.

Impact on the Economy

Structural fires may cause impacts on the economy depending on the scale and severity of the fire. Economic impacts of structural fires may result in lost wages from temporarily or permanently closed businesses, destruction and damage involving business and personal assets, loss of tax base, recovery costs, and lost investments in destroyed property (PEMA 2018).

Impact on the Environment

Environmental impacts from a structural fire could occur if hazardous materials are released. Debris from fire can also contain chemicals or substances, which may also impact the environment.

Future Growth and Development

Areas targeted for potential future growth and development in the next 5 to 10 years have been identified in Chester County (further discussed in Section 2.4 of this HMP update). Any areas of growth could be impacted by the structural fire hazard because all structures within the county are potentially vulnerable.

Effect of Climate Change on Vulnerability

Climate change could potentially impact the likelihood of structural fire. Areas located in the wild-urban interface could be more susceptible to a structural fire if a naturally-occurring wildfire spreads to structures. Extreme temperatures could potentially influence the instance of a structural fire, either from a higher air temperature or from using space heaters and heating appliances indoors during periods of colder weather.